

SUBJECT:	Fermilab Assessment Manual – Chapter 4 Independent Assessment Procedure – Form 1	NUMBER:	3902.1004 FORM 1
RESPONSIBILITY:	Quality Assurance Manager	REVISION:	000 C1
APPROVED BY:	Head, Office of Quality and Best Practices	EFFECTIVE:	

FERMILAB INDEPENDENT ASSESSMENT REPORT FORM

Fermilab Independent Assessment Report
Assessment Number & Title: 10-IA-QA-005 TD Work Process Controls Version: 001
Date(s) of Assessment: 5/17/10 – 5/28/10
Performing Organization: OQBP (in Coordination with the simultaneous Tripartite Assessment)
Assessed Organization(s): Magnet Systems, Superconductivity and Radio Frequency Development, Quality and Materials, and Test and Instrumentation Departments of the Technical Division (TD)
<p>Report content</p> <p>This report contains the following sections:</p> <ul style="list-style-type: none"> • Assessment activities & scope • Scope limitations • Activities Reviewed Within this assessment • Description of Implementation & Effectiveness of Observed Activities Conclusions • Findings, observations, & recommendations • Commendable practices <p>Assessment Activities & Scope:</p> <p>Implementation and effectiveness of controls for work processes, documents and records, and personnel training and qualification relative to the requirements of the Integrated Quality Assurance (IQA) and Fermilab Integrated Contractor Assurance (FICAP) program were examined via interview, document & record review, and process observations. This assessment examined the three requirements listed above for over 65 procedures in use throughout the TD departments listed above.</p> <p>Scope Limitations:</p> <p>This assessment included the procedures for equipment operation and cavity handling. Other procedures such as the traveler system, clean room operation, and calibration and maintenance were not part of the scope and were not assessed.</p> <p>Activities Reviewed Within this Assessment:</p> <p>Over 65 equipment operation procedures, work instructions, and cavity handling procedures were reviewed. See the “Documents reviewed” section below for a complete list activities and Procedures reviewed.</p> <p>Description of Implementation & Effectiveness of Observed Activities:</p> <p>General:</p> <p>The implementation of Work Processes, Documents and Records, and Personnel Training and Qualifications throughout the TD departments assessed was effective and controlled. The assessment team did find a number of issues and exceptions to these controlled activities as noted later in this report.</p>

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Though the number of issues found may seem high for an organization that has effective controls in place, it is small relative to the number of procedures examined and the number of employees interviewed over the 2 week interview period. They are therefore considered exceptions to an otherwise effective implementation. Additionally, most of the issues found were minor in nature.

Work Processes:

Personnel across all departments assessed used documented and controlled procedures for equipment operation and cavity handling. The level of detail contained in these procedures ensured effective control of the processes by the personnel executing them. Through observations and interviews the assessment team verified effective implementation of work processes. The following 4 exceptions were noted out of 65 procedures reviewed:

- Procedure 333902, section 3.2 requires a 2 person operation but it was observed being operated by a single person.
- Procedure 333951, section 5a requires cavity movement between buildings be done using a laboratory vehicle. Interviewees said that at times an open cart is used instead.
- Procedure TID-N-74, step 12 requires a 3 person operation but an interviewee stated that it is usually done by 2 persons.
- Procedure TID-N-76 step 31 states: “Use the large Pasternak wrench to tighten the “N” connector to the appropriate torque.” There is no longer a Pasternak wrench available in the area to complete this step. An operator indicated that the connector is manually tightened.

It was indicated during interviews that the procedures in the first and third bullets above that were being operated by fewer than the required number of personnel, were being done so due to the loss of personnel who have not been replaced.

In instances where the procedure could not be completed according to documented instructions, the operator deviates from the documented instructions instead of stopping and seeking resolution of the situation.

All of the above instances have been combined into Finding 1 in the Findings section of this report.

Documents and Records:

An effective document and record control system was observed in use by the assessment team. Most of the documents and records examined by the team as well as those in use by TD personnel were effectively controlled. Additionally, the use of electronic databases such as Vector and ONBASE were effectively used to track product status and location.

Over 65 processes and procedures were examined by the assessment team, with the following 9 instances of document and record control issues observed:

- Procedures 333500, 333901, and 333902 contained hand written changes. These hand-written changes have existed for an extended period of time without the official copy being updated.
- The hard copy of procedures 333906 and 333916 located on the corresponding equipment were an out of date revision.
- The Cable Making Machine Operation Guide is not controlled as it has no identification number, no date, and has not been approved.
- Procedure TID-N-76 steps 4 and 5 are no longer accurate because the clean room configuration

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has been updated.

- Procedure TID-N-106 needs to be updated to reflect the new McQuay chiller that is used.
- There was 1 instance of a person who did not know how to find the controlled procedure documents online. (He had an obsolete hard copy of his procedure.)

Note that the clean room referenced in the fourth bullet above is the small clean room or clean “booth” located in IB1 and not the main clean room located in MW9.

These instances have been combined into Finding 2 in the Findings section of this report.

Personnel Training and Qualification:

There is an effective system of training in TD that includes both OJT and formal training. All personnel were well trained in their work processes and very knowledgeable of overall operations in their area. The ITNAs examined for personnel across the 3 departments were generally complete and up to date. The following issues were found with training records:

- In the Magnet Systems Department, only 71% of required training records were in TRAIN. Training records for the 1 meter long winding table and the solder cart were missing from TRAIN. The assessment team did not observe any method to update training and re-train personnel when a new revision of a procedure is released

The team observed equipment, such as the Cable Insulating Machine, 1 meter long winding table, and Cable Tensioner 2 that contained a list of personnel that had been trained on that equipment. This “trained” list is not the same as a list of personnel who are authorized to operate that equipment, which is sometimes required. For some equipment, a supervisor defined authorization as training plus operating the equipment under supervision for a length of time.

Conclusions:

The TD departments in the scope of this assessment employ an effective system of work process controls to ensure that operations are carried out in a controlled manner. The procedures are written to an effective level of detail and are controlled via a formal document control system. Personnel are very experienced and knowledgeable and have received extensive OJT and formal training on the procedures they use for equipment operation and cavity handling.

Although the overall level of compliance to quality system and procedure requirements was high, there were some instances of non-compliances. These instances have been listed above or in the Findings section below.

Although the number of issues in this report may seem high, their number relative to the 65 procedures reviewed and the 30 persons interviewed, along with their relative minor significance, is consistent with a well implemented quality system.

Findings:

1. Integrated Quality Assurance (IQA) 1001 section 5.2.2 states: “...Personnel are expected to make every attempt to do their work correctly the first time, in accordance with established procedures and work instructions.” The assessment team made the following observations:

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- Procedure 333902, section 3.2 requires a 2 person operation but it was observed being operated by a single person.
 - Procedure 333951, section 5a requires cavity movement between buildings be done using a laboratory vehicle. Interviewees said that at times an open cart is used instead.
 - Procedure TID-N-74, step 12 requires a 3 person operation but an interviewee stated that it is usually done by 2 persons.
 - Procedure TID-N-76 step 31 states “Use the large Pasternak wrench to tighten the “N” connector to the appropriate torque.” The assessment team noted that there is no longer a Pasternak wrench available in the area to complete this step.
2. TD Quality Management Program (TD-2010) states: “...ensure that all issued documents contain the most current information.” The following instances are examples where the assessment team observed procedures in use that did not contain the most current information:
- Procedures 333500, 333901, and 333902 found on equipment contained hand written changes. These hand-written changes have existed for an extended period of time without the official copy being updated. The TD Quality Management Program Document (TD-2010) section 4.4 paragraph 3 states: “...authorized personnel may make hand-written changes to controlled documents as a temporary change only. The altered document should go through revision control as soon as is practical.”
 - The hard copy procedures 333906 and 333916 located on the corresponding equipment were an out of date revision.
 - The Cable Making Machine Operation Guide is not controlled as it has no identification number, no date, and has not been approved.
 - Procedure TID-N-76 steps 4 and 5 are no longer accurate because the clean room configuration has been updated.
 - Procedure TID-N-106 needs to be updated to reflect the new McQuay chiller that is used.
 - There was 1 instance of a person who did not know how to find the controlled procedure documents online. (He had an obsolete hard copy of his procedure.)

Observations and Recommendations:

Observation 1:

There are implementation issues with TID-2010, Technical Division Quality Management Program document and TID-N-93, The T&I department QA program description document..

TID-2010:

- Section 3.9 states: “Each department in the Technical Division has an employee grassroots safety committee” These committees have been charged to meet quarterly. However, there is no evidence these committees have been meeting.

TID-N-93:

- Section 2 states “The T&I Department organizational chart is kept up to date and published monthly by TD headquarters...”, however the latest web based organization chart observed by the assessment team is dated 2/1/10. The latest hard copy observed, TID-N-92, is dated 11/7/07

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- Section 4.3 states: “...the department’s Grass Roots Safety committee, which meets on a quarterly basis...”, however the last minutes observed by the assessment team were dated 2/2/09

Recommendation 1:

The assessment team’s recommendation is to have TD management ensure that up to date organization charts are available on a monthly basis and to ensure that the Grass Roots Safety committee is meeting at least quarterly, or to update TID-2010 and TID-N-93 to remove those requirements if they are no longer needed.

Observation 2:

Although outside the official scope of the assessment, the following safety related observations were made They are included because of their importance:

- The verification for zero energy in step 7 of LOTO Procedure TD5120-04 does not meet the requirements of NFPA 70E if electrical work is being done. NFPA 70E requires that an adequately rated voltage detector be used to test each phase conductor to verify that it is de-energized. Failure of the equipment to start does not ensure that the conductors are at zero volts. One phase of a 3 phase circuit could be energized or a circuit could have a shared neutral with another piece of equipment. Step 7 would be sufficient if the work only involved non-electrical work such as changing a fan belt.
- Review of training records showed that the T&I electrical support leader is almost 1 year past due for NFPA 70E training and that 70E training has not been identified as being needed for at least one other person in the group.
- There are inconsistencies in the amount of safety related information included in procedures across the Division. Many of the procedures the team looked at contained training requirements and listed the PPE needed to carry out the procedure. However, some were missing this necessary information. Examples include:
 - Procedure 333835, Tumbling operating procedure, section 3 does a good job of listing training and PPE requirements.
 - Procedure TID-N-161, VMTF Cryogenic Operating Procedures, does not contain training requirements or list any needed PPE.
 - Procedures 333900 and 333901, section 6.2 state “Personnel shall use/wear all appropriate/required PPE”, but does not specify what that PPE consists of.
 - Procedure 333938, Glove Box Operating Procedure, sections 3.1 – 3.5 require the use of acetone and isopropyl alcohol. It does not list any training requirements, PPE or MSDS. In Section 6, Special Precautions, it says that there are none. PPE and hazard mitigation requirements should be included in the procedure. Both liquids are flammable and acetone is a toxic liquid that can be absorbed into the body by contact or inhalation.
- Because of the above observations the review team asked if job hazard analysis (JHA) were being done. . Responses varied:
 - “Yes here is a copy of one I just did”.
 - “The procedures cover that”.
 - “Yes it was done when the equipment was first put into use.”

No one mentioned that they did mental JHAs or walk downs before starting any work that

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could pose a hazard. During a post assessment follow up meeting the review team observed many formal JHAs that have been written over the past 2 years.

Recommendation 2:

- Review LOTO Procedure TD5120-04 and all other LOTO procedures that require zero voltage testing to make sure they meet current requirements if electrical work is involved.
- Review ITNA's for employees identified as people that will need NFPA 70E training.
- Review existing procedures and determine if the training requirements and PPE requirements are described and communicated well enough so the employee is aware of the basic requirements necessary to prevent equipment damage or personnel injury.
- Encourage the use of the Take Five Program and doing mental JHAs on an everyday basis.

Commendable Practices:

1. The use of Vector and ONBASE databases to track product assembly and test status is a very effective system.
2. The use of photographs in many of the procedure documents is a very effective technique for communicating a large amount of unambiguous information quickly and accurately

Titles and Names of Person Interviewed:

- Jesus Alvarez
- Steve Gould
- Al Rusy
- Eloisa Ruiz
- Gilbert Whitson
- Tug Arkan
- Damon Bice
- Charlie Cooper
- Rick Espinoza
- Timergali Khabiboulline
- Oscar Lira
- Derek Plant
- Jim Rife
- Rob Riley
- Allan Rowe
- Brian Smith
- Glenn Smith
- Lucas Zimmerman
- Morgan Carter
- Adam Bracero
- Steve Helis
- Charlie Hess
- Fred Lewis

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- George Kirschbaum
- Dan Marks
- William Mumper
- Darryl Orris
- Joe Ozelis
- Roger Rabehl
- Jan Szal

Documents Reviewed:

333496 – 7 Meter Coil Winder
333499- LHC Winding Machine Operating Procedure
333500- LHC Curing Machine Operating Procedure
333501- LHC Measuring Machine Operating Procedure
333702- Cable Tensioner 2
333839– 6 meter long furnace
333900- Long Tooling Insertion/Extraction Fixture Operating Procedure
333901- Mandrel Stripping & Rollover Table Operating Procedure
333902- 1 Meter Long Winding Table Operating Procedure
333903- Solder Cart Operating Procedure
333904- 4 Meter Long Winding Table Operating Procedure
333905- Coil Curing Press
333906- Cable Insulating Machine Operating Procedure
333907- 84 inch Yoke and Skin Collaring Press
333913- Tube Furnace
333916- 2 Meter Blue Furnace Operating Procedure
333975- HiPot Tester (model 6900)
333938-Glove Box Operating Procedure
333950-Procedure for Inter-Facility Transport of 1.3 GHz One-Cell SRF Cavities
333951-Radio Frequency Cavity Handling Guidelines
333952-Procedure for Inter-Facility Transport of 1.3 GHz Nine-Cell SRF Cavities
333953-Quality & Materials Department Cavity-related Work Authorization Process
333954-Procedure to Authorize Personnel for SRF Cavity Handling at CAF
333955-Procedures for SRF Cavity Handling at CAF
333956-Procedure to Authorize Personnel for SRF Cavity Handling at ANL/FNAL SCSPF
333957-Procedures for SRF Cavity Handling at ANL/FNAL SCSPF
333958-Cavity Handling Procedure for ICB Cavity Optical Inspection System
333959-Procedure to Authorize Personnel for SRF Cavity Handling at IB4 RF Laboratory
333960-Procedures for SRF Cavity Handling at IB4 RF Laboratory
333962-General handling and inter-facility transport of SSR1 resonators
333965-General handling and inter-facility transport of RTCH resonators
333976-Procedures for 1.3 GHz SRF Cavity Handling at the IB4 Tumbling Area
333977-Procedure to Authorize Personnel for 1.3 GHz SRF Cavity Handling at the IB4 Tumbling Area
333835-Tumbler Operation Procedure
Ultrasonic cleaners operating procedure (posted at machine)
TID-N-223: VCTF Cavity Test Procedures
TID-N-161: VMTF Cryogenic Operating Procedure - Refrigerator Mode

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<p>TID-N-168: VTS Cryogenic Operating Procedure TID-N-167: VMTF Warm and Secure Checklist TID-N-166: VMTF Pre-Warmup Checklist TID-N-165: VMTF Overnight Shutdown Checklist TID-N-164: VMTF Pre-LHe Cooldown Checklist TID-N-163: VMTF Pre-LN2 Cooldown Checklist TID-N-162: VMTF Insulating Vacuum Checklist TID-N-161: WMTF Cryogenic Operating Procedure – Refrigerator Mode TID-N-151: T&I Hipot Procedure TID-N-146: Hins Test Stands #2 & #6 Cryostat Magnet Warm Electrical Checkout Procedure TID-N-144: HINS Test Stands #2 & #6 Cryostat Magnet Cold Electrical Checkout Procedure TID-N-139: Test Stand 3 Cryogenic Operating Procedure - HINS Bare Solenoids TID-N-119: Test Stand Warm and Secure Checklist Stands #2 & #6 TID-N-115: Saver Magnet Test Stand Warm-up procedure TID-N-106: IB1A Chiller Bay Switchover to Summer Mode TID-N-93: T&I Department QA Program Description TID-N-92: Test and Instrumentation Department Organization Structure TID-N-76: Procedures for Preparing SRF Cavity for Testing TID-N-75: Procedure to Authorize Personnel for IB1 SRF Cavity Handling (DRAFT) TID-N-74: Procedures for SRF cavity handling at IB1 TID-N-73: T&I department document control policy and procedures TID-N-56: QLM Verification Procedure TID-N-55: DUT Safety Data Sheet Procedure (Superconducting) TID-N-20: Test Process Description TID-N-19: Test and Instrumentation Department Records TID-N-15: Conduct of IB1 Test Facility Operations TD-5120-04 CCI Cold Compressor LOTO Procedure TD-4020: Use of PPE in Technical Division Buildings TD-2010: Technical Division Headquarters Quality Management Program</p>	
Standards, Regulations, and Other Program Requirements Applied:	
<p>The specific criteria applied to this assessment were:</p> <p>Fermilab Integrated Quality Assurance (IQA), Document 1001 Chapter 2 - Personnel Training & Qualification Chapter 4 - Documents & Records Chapter 5 - Work Processes</p>	
Describe or List Any Other Assessment Methods Used: None	
Corrective Action Plans Issued:	
<ul style="list-style-type: none"> • TD-20100623-01: Documented procedures and work processes are not being followed. • TD-20100623-02: Documented procedures obsolete, missing, or containing hand written changes. 	
Assessors' Names (asterisk indicates team leader):	
John Martzel* Keith Schuh	
Submitted by: John Martzel	Date: 6/23/10
Distribution:	
Giorgio Apollinari	

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<p>Jamie Blowers Ruben Carcagno Mark Champion Jeff Cotton Bob Grant David Harding Jed Heyes Mike Lamm Jim Rife Keith Schuh Romesh Sood</p>
Attachments: None